FLARE ACTIVITY PREDICTION IN SUNSPOT GROUPS (D, E, F)

M. Jakimiec[1], M.Wanke-Jakubowska[1], J. Paciorek[1], P. Majer[1],
A. Bartkowiak[2]

[1]Astronomical Institute of Wroclaw University, Wroclaw, Poland

[2]Institute of Computer Science of Wroclaw University,
Wroclaw, Poland

EXTENDED ABSTRACT. To analyse the forecasting possibility of the variable characterising the sunspot group (D, E, F) flare activity, the following statistical methods were used: principal components, common factor, distribution and regression analysis.

The investigation is based on the observational data for 1979 contained in SGD. We specify eighteen sunspot group characteristics. Fourteen represent the predicting variables - the set of input data, seven of them refer to the photosphere and seven describe the sunspot group flare activity. The predicted variables are:

- maximum value of the X-ray flux (1 - 8 Å),
- the number of strong X-ray flares,
- total flare flux in range 1 - 8 Å,
- total flare flux in range 0.5 - 4 Å.

We have tested that our statistical sample is random and unbiased. We have investigated also the sample homogeneity. So we analize the unstationarity effect of the solar cycle and the effect of sunspot group evaluation phases. We found that the unstationarity effect is not important, instead we have conclude to examine separately for sunspot group increase and decay phase the interconnection structure.

We have tested the zero-hypothesis that the correlation matrices calculated for both evaluation phases are identical. We obtained the value of statistics $\chi^2 = 381$ much greater then the critical value $\chi^2_{0.05} = 113$, and so our zero-hypothesis was rejected.

The more detailed examination of the interconnection structure was performed by using the common factor analysis method. We obtained that the structure of factor loadings computed separately for both evaluation phases is, in principle, similar. The essential differences were found for values of factor

loading for the predicting variable matching the quotient of the total Fh and Fs X-ray fluxes.

The estimation of the predicting algorithm parameters of the predicted variables was performed separately for both evolution phases. We found that the values of determination coefficient RR were evidently greater for the decay evolution phase. The greatest value was for the predicted variable characterizing the total flux Fh.

This paper will be published in more detailed form.